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ABSTRACT

Colleges that have prepared students for entry-level school positions are now turning their attention to the development of continuing professional education programs. If educational needs and expectations of employed school personnel are to be satisfied. program development will require a new kind of interaction between schools and colleges. For many colleges, establishing such a relationship will require creation of new communication links. The purposes of these links include (a) identifying educational needs of school personnel, (b) identifying university and school resources available to meet the needs served by educational programs, (c) providing information for administrative decisions, and (d) acquainting research and development staff with real problems in field settings. The purpose of this report is to provide a basis for establishing communication links. It contains a review of selected literature dealing with information dissemination and utilization models, linking systems, linking techniques and strategies, and systems design. It also contains a proposal for a linking system between a college and schools of the state. Finally, it provides a set of guidelines that individuals and program units may follow as they plan to use the linking system. (Author/MJM)

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LINKING SCHOOLS AND COLLEGES TO DEVELOP CONTINUING EDUCATION PROGRAMS FOR SCHOOL PERSONNEL

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Linking Schools and Colleges to Develop Continuing Education Programs for School Personnel

Colleges that have prepared students for entry level school positions now are turning their attention to the development of continuing professional education programs. If the educational needs and expectations of employed school personnel are to be satisfied, program development will require a new kind of interaction between schools and colleges. For many colleges, establishing such a relationship will require the creation of new communication links. The purposes of these links include: (a) identifying educational needs of school personnel, (b) identifying university and school resources available to meet the needs served by the educational programs, (c) providing information for administrative decisions, and (d) acquainting research and development staff with real problems in field settings.

The difficulty standing in the way of college-school communication is that experience with linking is limited: the traditionally independent roles of schools and colleges have not encouraged relationships needed at this time. A further problem lies in the fact that new school and college roles are emerging in proposals for continuing and in-service education of school personnel. With these new roles, new relationships between individuals and institutions are developing.

In the past decade, the production of literature relevant to the solution of the problems of role, relationship, and communication links has accelerated (Dahling, 1962; Havelock, 1973). The sources include books and journals in the fields of communication science, communication technology, social psychology, systems analysis, management information systems, and industrial relations. Writers treat the topics in the context of the academic and professional concerns of mathematics, physics, psychology, speech-communications, journalism, nursing, agriculture, engineering and education.

The purpose of this report is to provide a basis for establishing communication links. It begins with a review of selected literature dealing with information dissemination and utilization models, linking systems, linking techniques and strategies, and systems design. It continues with a proposal for a linking system between a college and schools of the state. Finally, it provides a set of guidelines that individuals and program units may follow as they plan to use the linking system.

Information Systems: Models, Strategies, Techniques

The nature of the linkage constructed between the schools and the College must differ in accordance with the set of roles and relationships assigned to these units. Rarely are the roles and relationships discussed directly in the literature on communications, dissemination, or systems analysis; rather, they are implied by the nature of the system described or the techniques of communication and dissemination proposed.

System Models

In the course of an examination of more than 4,000 items, Havelock (1973) identified three distinct points of view toward dissemination and utilization in the models, theories and analyses of the authors. To these he added a fourth model for the dissemination and utilization process.

To Havelock's four models, Reynolds (1973) added a fifth. Although the names they assigned to the four models differ, the characteristics they ascribed to them are similar. Each of the five will be described briefly as a basis for conceptualizing linkage systems and presenting preferred roles and relationships for the College and the schools.

Reynolds wrote first of the "Sovietized Approach" to the planning and implementation of training programs, or, in more general terms, the dissemination and utilization process. It involves "the specification of needs and plans at a central, national level, followed by the central allocation of functions and resources deemed necessary to accomplish the desired training outcomes. All institutions and individuals would be treated as subsidiary to the centrally specified goals and plans (1973, pp. 7-8)." The information flow is one-way. The diffusion strategy is one of intervention. The adopter or user is assumed to be one who can be compelled.

A second strategy Reynolds called the "Institution of Higher Education Dissemination Model" and Havelock called the "Research, Development and Diffusion Model." The R, D & D model starts with research and research products and delineates a path to the user, passing through development, demonstration, dissemination and adoption phases along the way. Reynolds stated that this model assumes "that the necessary knowledges and skills are stock-piled within or could be developed by institutions of higher education, and that their main problem is diffusion or dissemination (1973, p. 8)." As in the Sovietized model, the information flow is one-way. However, the adopter can not be compelled. There may be an assumption that he is a rational being who can be

persuaded, on the basis of hard data, that he is a professional who may feel professional obligation, or that he is untrained but can be taught to perform. The diffusion techniques will likely involve telling, showing, and involving the adopter (Guba, 1968). Reynolds (1973, p. 9) noted that when this model is employed, the money goes to higher education, the trainees are admitted to training on the basis of individual promise as a candidate, and that the commitment to the need of a particular community is absent.

A third model Reynolds called "Local Needs Assessment" but Havelock labeled the "Problem Solver Model." Within this strategy, the specification of local needs becomes the primary activity, with the university becoming the sub-contractor, according to Reynolds' view. Havelock described it as a system beginning with a felt need that becomes articulated as a problem followed by a search for solutions, choice of solution and application of solution. The attention of those outside the user system, i.e., outside the school, is to diagnosis of needs and collaboration with the user system.

Again the information flow is one-way, but this time from the school, which has the need, to the college. Money is in the hands of the school. With it, it buys the help it requires and thus exercises some control over the college. Diffusion techniques will possibly include showing, telling, helping and training, but the choice from among them will probably be decided by the desires of the users rather than by the assumptions the college faculty makes about how diffusion of knowledge and skill is best accomplished.

The "Voluntary Collaboration Model" described by Reynolds and the "Social Interaction Model" described by Havelock are sufficiently similar to be viewed as one. Both are based on voluntary interaction and two-way or dyadic communication. These characteristics also distinguish this model from those previously described. As they described the model, Reynolds and Havelock differ in the attention they gave to particular components of the model and in their attention to institutional or personal communication. Reynolds emphasized the participation of agencies in planning training programs for teachers of exceptional children and characterized the interaction as "sensitive and generous cooperation (1973, p. 11)" designed to enhance the plans of all concerned. Havelock emphasized the diffusion elements of the model and stated that social interaction theorists "see the society as a network of roles and channels of communication with organizational and formal and informal associations forming barriers and overlapping connections (1973, p. 2-43)." His illustrations for the model were drawn from research on the factors

influencing individual doctors, farmers, and teachers to adopt innovations in their fields of practice. The significance of the model is in the importance it attached to the location of individuals in the social structure and the relationship of this location to interpersonal communication and the adoption of innovative practices. The contrasting implications between this model and other models are illustrated in Guba's (1968) view of diffusion and innovation as taking place with one-way information flow and Katz's (1962) view of its taking place in a dyadic mode.

Both Reynolds and Havelock presented as their preferred model one they labeled a "macrosystem." Reynolds also referred to it as a "Problem-Solving Model." It is an interaction system consisting of two-way linkages between units or sub-systems of the macrosystem. Havelock stated that "the major (institutional) components of this framework are (1) the university, (2) the scientific professions, (3) the practice professions, (4) the product organizations, (5) the service organizations, (6) the consumer organizations, (7) the government, and (8) the media." He distinguishes between the "institutional framework" and the "functional subdivisions" within the knowledge diffusion and utilization system, which he designates "basic research," "applied research and development," "practice," and "consumption" (1973, 3-3). Figure 1 is Havelock's diagram of the system.

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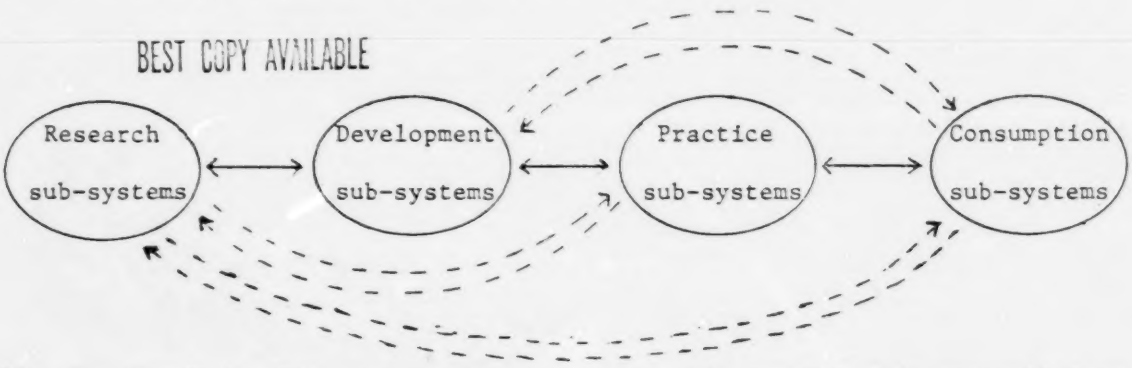

Fig. 1. Knowledge flow macrosystem roles: An ideal model with controlled access and sequence suggested.

The model differs from the Voluntary Collaboration system in several respects, but particularly in that it calls for a strong partnership in which problems are identified, alternatives are explored, and decisions are made cooperatively on the basis of needs assessment and resource analysis. Schools would acquaint the university research and instructional units with the problems in field situations; the university would design programs to meet needs of schools and to help them solve problems. Reynolds (1973, p. 18) noted that the model implies (a) continuous, two-way linkage between the university and the community and schools, (b) continuous,

two-way communications between professional departments and disciplinary structures of the university, (c) the design of training, research and service activities by professional departments in concert with the practice and consumer system, and (d) an intermediary role for the professional departments in which they inform disciplinary departments of consumer system needs and draw university talents to community settings.

The central concept of the system is that of "linkage," which Havelock, the originator of the term, described as "a series of two-way interaction processes which connect user systems with various resource systems including basic and applied research, development and practice (1969, p. iv)." He continues with comments on the significance of linkage as follows:

> Senders and receivers can achieve successful linkage only if they exchange messages in two-way interaction and continuously make the effort to stimulate each other's problem solving behavior. Hence the resource system must appreciate the user's internal needs and problem solving patterns, and the user, in turn, must be able to appreciate the invention, solution formulation and evaluation processes of the resource system. This type of collaborative interaction will not only make solutions more relevant and effective but will build relationships of trust, mutual perceptions by users and resource persons that the other is truly concerned, will listen, and will be able to provide useful information. These trust relations over time can become channels for the rapid, effective, and efficient transfer of information (Havelock 1969, p. iv).

Linkage: A Sub-System

Communication links are essential elements in each of the five systems presented. Characteristics of the links vary with the demands placed on them by the different systems. Within the links themselves there is a flow of activities and a sequencing of hardware utilization or interpersonal contacts that can be organized as a sub-system of the larger communication system.

The function of the sub-system is to carry messages in a regularized pattern of one-way or two-way flow between elements of the larger system. The components of the sub-system attend to data gathering, data processing (i.e., converting data into information) and information dissemination.

The persons who engage in linking activities, the linkers, should be uncommitted middle men, belonging to neither the user nor the resource groups (Farr, 1969). They should be able to assist in carrying messages by (a) helping users formulate useful questions and analyze responses to create information, (b) selecting appropriate hardware and providing the human resources to carry messages, (c) storing data and information for recall as needed, (d) provide

a retrieval system readily accessible to users, and (e) programming the linking process.

As first steps toward designing a linking sub-system one may examine (a) the kinds of communications techniques and strategies available and the experiences of others as they used them; (b) the sources of information on data gathering, storage, analysis and dissemination processes; (c) the ways to increase the likelihood that a linking system will be used; and (d) the available models of linking systems. This section of the report will treat each of these topics.

The designer of a linking system has several channels from which to choose as he selects communication techniques and strategies. Some are long established and well developed; others are in developmental stages with much of their potential unexplored. Among the former are information diffusion techniques such as specialized periodicals, mass media, conferences and conventions, direct mail, technical bulletins, seminars, workshops, formal college instruction and informal, interpersonal channels of communication. Farr (1969) stated that "extensive studies have shown that informal interpersonal channels of communication are by far the most effective way to reach an audience...That is," he said, "word gets around best when people talk to each other." He continued, "It is the interpersonal network of communication, therefore, that the linker must seek to activate. The use of the media cannot be ignored, however, for it is an important element in the activation process."

There are also long established methods used to obtain information or feedback from resource users. Among these are the surveys using questionnaires, rating scales, interviews and polling techniques. The carefully developed practices used in market surveys have applications here (Sweigert, 1967). The committee formed of representatives from user and resource groups is a recommended device where recommendations, opinions, planning and evaluation are needed (Beveridge, 1969; Hook, 1970). Barkelew (1973) lists seventy-three communication strategies and techniques for information gathering and dissemination using variations on the general methods mentioned here.

Educational linkers who have an innovative or creative bent are finding applications for technology developed in other fields. Audio cassette recorders, video tape recorders, cable T. V., computers, teletype, card sorters, microfilm and microfiche are a few of the items that are being combined into systems for data gathering, storage and dissemination. Among these are "dial access" systems (Beveridge, 1969; Niles, 1971) combining telephones and cassette or video tapes;

interactive television (Baruch, 1969) using telephones, computers and T. V.; a computer based information system using a computer, telephone, film, cathode ray tube and typewriter (Minor, 1970); aperture card filing systems using microfilm and Hollareth cards (Bogue, 1967; Pierson, 1967); hot lines for rumor control, information and referral, or for access to community ideas and information (Dyment, 1971) using telephones,cassettes, radio or other devices as needed. Gradwell (1972) lists twenty-one items of display hardware that may be used in designing communication systems for teacher education.

Linking Techniques and Strategies

The person who would design a linking system needs access to sources of information on process. One step in this project was to locate useful statements about process by searching ERIC files, the Education Index, Psychological Abstracts, Sociological Abstracts, and bibliographies of relevant journal articles. From the books and articles identified, selected ones are reported here. Discussion of the processes would require a large volume and, therefore, is not a part of this report. Rather, this is a guide to selected resource material.

In one form or another the problems of surveys are common to many other forms of linking. For this reason an acquaintance with references dealing with surveys is of primary importance. A technical handbook on the full range of survey problems is to be found in Yates (1960). Furno (1966) discussed eleven steps to be taken to develop a survey, from the statement of survey objectives through processing the data. Erickson and Oliveris (1964) should be particularly useful to one who is about to prepare survey instruments or write a report of the findings from the data analysis.

Surveys may be classified according to the purposes for which they are conducted (Brieve and Johnston, 1973); the time at which they begin data collection, i.e., panel or follow-up (Eckland, 1968);and the kind of analysis that will be made, i.e., descriptive, correlational or explanatory (Brieve and Johnston, 1973).

Surveys may call for follow-up of a sample of people. Whether the survey begins with a sample and follows individuals over a period of time or begins with past records and seeks to locate individuals, retrieving mobile cases is a difficult problem. Eckland (1968) dealt with this and cited methods used in surveys yielding high rates of return.

Brieve and Johnston (1973) also discussed the type of tasks to which surveys may be directed as well as the kinds of data gathering for which

they are ill suited. Geisert (1973) treated in a specific way the use of the survey to identify and objectively rate the problems of concern to a set of teachers.

The information gathering devices most frequently used in conducting a survey are the questionnaire and the interview. To obtain specific kinds of information a Delphi technique (Cyphert & Gant, 1970), a rating scale or a counting device may be employed. Yet another is that of direct observation (Phillips, 1971). Only the first two will be discussed in this report.

The most frequent concerns of those who use questionnaires deal with asking the right questions, phrasing questions unambiguously, designing the questionnaire format, obtaining a high response rate, securing complete and valid answers, and assuring anonymity to respondents.

As viewed by Payne (1951), writing questions is an art. However, there are rules that one may follow to develop skill in formulating questions. Payne concluded his book with a "concise check list of one hundred considerations" (p. 228). Even more concise is the list of ten guidelines for formulating and organizing questions that Freed (1964) presented. Hoyt (1972) reported a study of twenty-three quantifying adjectives "frequently" used that may not mean the same thing to all people. Gruikshank (1971) has pointed out that projects are developed in stages and that if one is to formulate questions that will yield helpful answers, one must first be very clear about the current stage of development of the project. He illustrated the point by conceptualizing a process for curriculum development in teacher education, designing questions for each of four stages.

Designing the questionnaire received extensive attention in Selltiz (1949), Hendrich (1972), and Nixon (1954). Format, the covering letter, envelopes, mailing and follow-up letters are among topics covered. Nixon stated that "the ultimate objective is to obtain as many responses as possible, in the form of completed questionnaires which provide usable data (p. 487)." Additional help is available in Alderfer and Brown (1972) who reminded us that a questionnaire provides a respondent with information about the researcher--what he thinks is important and what he already knows about the respondent's circumstance. They noted that irrelevant questions increase distance between the respondent and questioner. In the same cautionary vein Berdie (1970) listed topics and questions that "rile" the persons from whom one hopes to obtain cooperation. In an article containing a number of positive suggestions, Levine and Gordon (1958-59) emphasized the importance of preparing the respondent

for the questionnaire he is to receive, designing the questionnaire to give a positive initial impression, and writing questions that are interesting and meaningful to the respondent.

Although response rates of 70 to 80 per cent are common in survey reports, Eckland (1968) cited ten studies in which returns exceeded 90 per cent. Several of these involved follow-up after a period of 10 to 25 years. Champion and Sears (1969) reported an experimental study of the return rate for a sample of telephone subscribers in which the variables were the length of the questionnaire, the type of postage, and the type of incentive in the covering letter. They found that the return rate was greater from longer questionnaires, hand stamped letters and egoistic rather than altruistic appeals. Snelling (1969) secured a 92 per cent return using a personalized approach in a study of 1,452 liberal arts college graduates. He described the procedures he used. Alderfer (1968) conducted a study to determine whether trust in, and acquaintance with, the researcher affected return rate but obtained unclear answers to the questions. Robin (1965) described the use of follow-up letters as a device to increase the response rate. He reported the timing and the shifting emphasis in the follow-up letters and concluded that these factors are of great importance to the success of the device. Further suggestions to improve the rate of return are to be found in Erodos (1957).

In some instances the guarantee of respondent anonymity may be a significant factor in obtaining a high rate of return, complete responses or valid answers. Bucher (1969) and Anderson (1973) presented two methods which assure that the researcher can not associate a respondent with his answer but enable him to identify those who have not yet responded.

Boruch (1969) presented an analysis of ethical and practical problems of confidentiality in educational research, dealing with each level of a survey system and evaluating alternative devices that can be used to protect respondent anonymity.

The second principal device used to collect survey data is the interview. Maccoby and Maccoby (1954) discussed the bases for choice between the questionnaire and the interview. Richardson, Dorenwend and Klein (1965) also noted that similar questions may be answered orally or on paper, but the techniques have distinctive advantages and disadvantages in the areas of error source, standardization, recording, respondent cooperation, question and answer process, and situational determinants of responses. Some inferences about the different uses of the two may be drawn from the fact that information about questionnaire

construction and use tends to appear in psychological and educational journals, whereas the books and articles about interviewing and polling tend to appear in the literature of sociology, anthropology and market research. Peach (1972) stated that the interview can deal with three areas: knowledge, opinion and vision of the future. Richardson, Dahrenwend, and Klein (1965) explored in greater detail the forms and purposes of the interview.

A particular concern in polling is the possibility that bias in the interviewer might cause serious bias in the responses. Hyman (1954) reported and in-depth study of the sources of the errors which occur in survey research as a result of the method of personal interviewing. The project was sponsored by a joint committee of the Social Science Research Council and the National Research Council. Maccoby and Maccoby (1954) discussed how to avoid methodological problems for accurate data reducation and analysis.

At the applied or procedural level several books can be of direct assistance. The selection and training of interviewers, the phrasing of questions, the recording of answers, sampling and respondent selection, securing respondent cooperation and similar topics are treated in Smith (1972), Maccoby and Maccoby (1954), and the Interviewer's Manual of the Survey Research Center of the Institute for Social Research (1969).

The process of turning data into information requires storage or recording whether it is to be processed immediately or later, on a one-time or recurring basis. The way in which data are to be manipulated is an important consideration in selecting the type of file and the method of assessing it. The available systems include hard copy stored in various cabinet types or on rolodex, accessed by hand-sort methods; hard copy arranged for keysort (Holcomb, 1970); photo reduction systems such as microfilm or microfiche accessed by machine (Miller, 1972; Bacon, 1972; Bogue, 1967; Pierson, 1967); and "on line" or "remote" computer files (Holland, 1973). Combinations of these devices may be worked out for specific purposes (Miller, 1972).

The characteristics of the storage system are affected by the characteristics of the data, how information is collected, how it is processed prior to storage, how it is to be stored and how it is to be retrieved (Miller,1970). Liston and Mercker (1973) gave instructions for choosing among classification systems to be employed in organizing an information system. Dietz (1970) identified the questions one must answer in the process of setting up a computer based information system and illustrated the process with an example from marketing.

One way to conceptualize the continuing education macrosystem is to view each element as both a resource and a user. It is in this general context of two-way communication that Rogers (1968) discussed the question: "How can a large university provide for continuous self-renewal?" Schools are users of university resources, but university curriculum development units may be users of school resources as they plan curriculum appropriate to changing field circumstances or projected developments. Dissemination of information then occurs in two directions, and the methods of diffusion should be chosen to be appropriate to users in different circumstances who seek different kinds of information.

In this report there is a previous reference to methods of information dissemination: printed, oral and technological. Some methods have not been reported or may be given further documentation.

Variations on the hotline using the telephone (Dyment, 1971), dial access to continuing education cassette tapes (Niles, 1971), or the computer (Minor, 1970; Foley, 1973) may be used to inform school personnel of university courses available on a regular basis or to give them information about procedures, addresses of faculty, schedules and like matters. Similarly, information about special skills, knowledge or experience of faculty may be available in files for the information of university curriculum planners who are attempting to meet a users request for a course, a workshop or a seminar.

The most frequent types of dissemination from surveys and data gathering projects is likely to be the written report, the tabular data, the brochure, the oral report, and reference consulting. Kochen (1969) noted the resources needed by the reference consultant: memory, files and colleagues. Farr (1969) wrote of the flow of knowledge aided by knowledge linkers who activate the interpersonal network of communication within the target audience. He stated that:

> The information processor must be familiar with the desires, personalities and day-to-day considerations of his intended audience. He must be familiar with the resource system of educational knowledge so as to know where to turn in pulling together the necessary elements for a comprehensive treatment of a topic. He must also know the principles of attitude change, packaging, consumer motivation and all of the various factors that go together in making a message maximally efficient in reaching and having the intended effect on its audience (p. 6).

The ultimate purpose of the linker is to make the connections that enable the resource system and user system to exchange the information that will help each system perform its function better. It is in this sense that the linking

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system has a diffusion function. Farr 1969) diagramed it in this way:

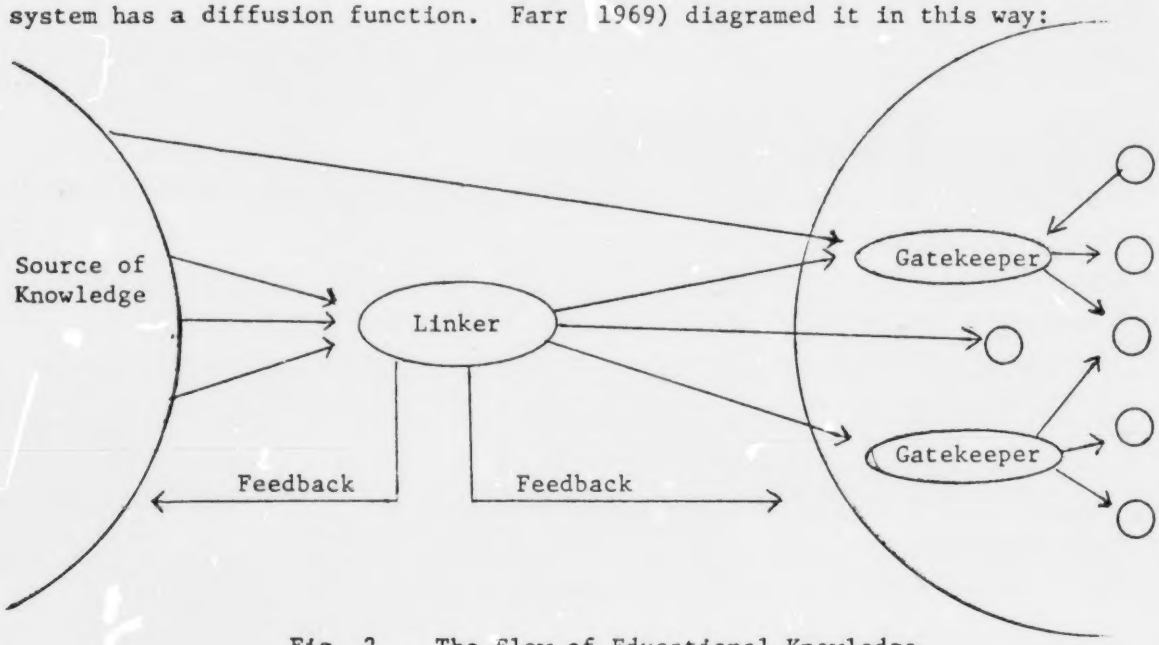

Fig. 2. The Flow of Educational Knowledge

Increasing the Use of a Linking System

The development of a linking system does not assure that linkage will take place--that the system will be used. The interest in establishing a linking system is based on assumptions that people lack information, that it is possible to specify the information they need, and that if they have information, their functioning or performance will improve (Dumas, 1968). There can be no assumption that they will be motivated to attend to the messages from the linking system. Four conditions must be met for successful communication to take place (Rogers, 1962b; O'Neil, 1970). One must first gain the attention of the intended audience; second, use signs understandable to the audience; third, arouse personality needs in the audience and suggest ways to meet the needs; and fourth, make the suggestions appropriate to the group situation the audience finds itself in when the decision is made to act.

Miller (1970) indicated that the reasons people use or avoid using an information system fall into three categories: personal factors, interpersonal factors or systematic factors. She listed examples of each factor. The examples of personal factors deal chiefly with matters of need, self-concept, and consistency with previous behavior or decisions. Interpersonal factors are of two types: (a) the credibility, reliability and importance of the message sender, and (b) the social support of peers. Atwood (1966), Cole and Harty (1973) and Klehr and Menacher (1973) wrote further on the significance of the interpersonal factors.

Systematic factors are concerned with transmission and feedback, selection of appropriate media, translation of information into terms geared to the user, and assistance to the user.

Since the reasons people use the system are personal, not all users are equally ready to attend to information that may suggest a need to change ideas or behavior. The question then becomes, first, one of identifying those most likely to attend to information and, second, one of modifying the system to gain attention of others.

Lewin is given credit for establishing the concept of the "gatekeeper" in mass communication research (Robinson, 1971). The gatekeeper is one who selects and restricts information to receivers. He is the one in the target audience who is more active than others in introducing new information into the person-to-person communication network (Farr, 1969). For the linker the first step in communication may be to find the gatekeeper within a group and to influence him or establish communication with him (Robinson, 1971). Farr stated that the gatekeeper may be identified by four characteristics: (a) he uses mass media and other sources of information external to his group; (b) he is oriented to persons and topics external to his group, e.g., he attends conventions; (c) he participates socially in his own group, and (d) he is innovative.

System Design

Banathy (1970) stated: "The interface characteristics of information systems are varied as to the degree of formality, structure, intensity and frequency of interactions and as to the content, scope, depth and relevance of information input and output desired and the kind of information handling required. More specifically, who is to initiate the information request; how is it to be retrieved, analyzed and processed; in what form, to whom, and when is it to be presented; how is it to be used; and how is its use to be evaluated?" These are considerations of system design.

The overall and ultimate system problem of concern to Banathy was one of curriculum decision making to enhance student achievement. The problem can be recast, naming a specific group and broadening the area of decision making as follows: How can we enhance the continuing professional education of school personnel by the activation and maintenance of an integrated set of information systems? Component system problems noted by Banathy are these:

> By what planning, programming and management arrangements, entities and processes can we optimize curriculum decision making?

> In what form, in what quantity and quality and through what arrangements, entities and procedures can we present information on educational developments which will be of optimum use to the schools?
>
> How can we retrieve, organize, store and make quickly and easily accessible curriculum-relevant information concerning the R and D domain (p. 27)?

Gradwell (1972) proposed a systems approach to organize the total scope of a communications system sequentially. His objectives were to obtain a continuous interplay between considerations of the advantages and limitations of communication hardware and to develop the best match between personnel and machines. Gradwell showed the components of the communications process to be as in figure 5, pg. 18.

Foley (1973) conceptualized an information system made up of a user who is seeking information, a program and data bank with which the user interacts through the computer, an author responsible for writing a computer program and developing a data bank, and a resource person who helps the user adjust to the system. He diagramed it in this way:

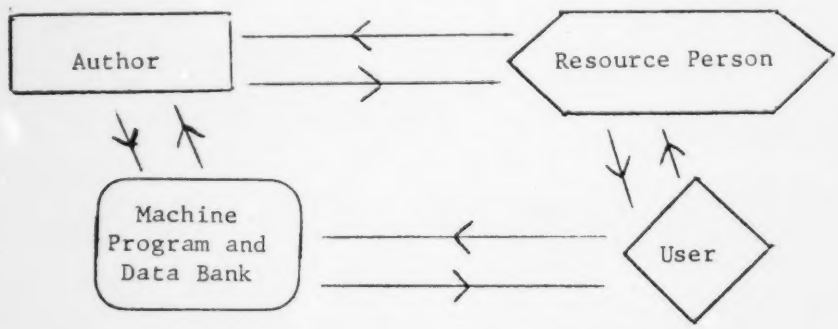

Fig. 4. Communication Model of Information System

In Foley's view, the communication process consists of (a) comprehending the user's input to the system and (b) selecting the appropriate response to the user.

One difficulty with the model is that it does not provide a link to collect data from other sub-systems of the total continuing education program development system. The data are generated within the information system rather than by questioning an outside source.

Stark (1971) reported a system designed to give educators and administrators a continuing reading on community attitudes, i.e., to collect data from one system to be used by another, truly a linking system. This system, created to gather, analyze and report information in one month, used volunteers to poll

by telephone and in face-to-face interviews, and to store and analyze data by computer. Peech (1972) supports the interview as the preferred information gathering device for surveys conducted to gain an understanding of a community served by an educational program.

A second difficulty in the Foley model is that it does not provide feedback. Silvern (1967) declared that unless there is continuing feedback from users through a closed loop system, instruction will tend to age and grow old in the onrush of new methods, new materials and new procedures. He pointed out that sudden decisions to add programs are not uncommon and that suddenness may produce programs that are as up-to-date as instructors. Feedback, he says, "should not only exist, but it should operate in nearly 'real-time.'"

The report of a Battelle-Columbus Laboratory study (1972) gives additional reason for concern that feedback be built into an information system. The authors noted that it is through feedback that one obtains a systematic reduction in the discrepancy between the skills and levels of performance a student acquires and those he needs to perform on the job. Havelock (1969) gave extended treatment to the devices by which one-way and two-way feedback may be accomplished. Others who have written on the significance of feedback are O'Neil (1970), Siegmann (1969) and Beveridge (1969). Five questions that may be helpful guides to determining feedback topics are given by Rosenthal (1968).

Miller (1970) observed that once an information system is available, users usually need a linker who helps system designers understand user needs, provides feedback on adequacy of the system and assists the users. Farr (1969) stated that there is a lack of recognized precedence for the role of a linker. He attempted to clarify it as follows: "The linker must go to his audience in the user system and discover what sorts of information are desired. He then turns to the resource system and looks to see if such information is available. Often it is not. In that case the linker serves as a go-between in a sort of two-step feedback channel wherein he provides the researcher with guidance for further research efforts (p. 7)." Farr also listed the qualifications of the linker: familiarity with the desires, personalities and day-to-day considerations of the intended audience; familiarity with the resource system of educational knowledge; and familiarity with principles of attitude change, consumer motivation, packaging, and other factors that enable a message to have its intended effect.

In summary, considerations that should enter into the design of a linking sub-system appear to be these:

1. What components are to be included in the linking system?
2. What are the interface characteristics to be?
3. What are to be the roles and relationships of resource and user persons in the planning, development and dissemination stages of the program for continuing professional education?
4. Will the direction of message flow be one-way or two-way?
5. What are the available communication techniques, modes and strategies?
6. How are the human and machine elements of the system to be combined?
7. How will the use of the system be encouraged?

Design for a Linking System

The decision to plan a linking system to serve continuing education programs grew out of some observations about the changing educational scene and the current state of communication. Five of these items provide a rationale for the system.

1. The roles and relationships between the schools and the colleges that prepare personnel to staff the schools are changing from independence of each other to shared responsibility for decisions and for program maintenance.

2. School and college personnel recognize a need for interaction among institutions to solve problems.

3. Among problems to be solved jointly are those that lie in three domains: (a) enhancement of ability to conduct improved training, (b) provision for delivery of relevant knowledge to service settings, and (c) relay of real problems in field situations to research and development personnel.

4. A formal structure for interaction will enhance the communication between systems.

5. The type of linking structure will influence the outcomes of communication among systems.

This report began with the statement that the development of continuing education programs for school personnel requires the creation of new communication links between a college and the schools of the state. The report continued with a brief discussion of five systems providing different information flow or linking characteristics. One of these provides a continuing, two-way linkage between the College and the schools for the needs assessment of each and the diffusion of information in both directions. It is this model that will be the basis for the proposals that are to follow. This general model from Havelock (1973) includes four sub-systems: (a) research, (b) development, (c) practice, and (d) consumption. Information may flow in either direction between adjacent sub-systems, and thus through all sub-systems. Messages may also flow to non-adjacent sub-systems through feedback loops.

The conceptualization of the relationship among sub-systems is important to the design of a linking system since the roles and relationships of sub-systems determine the characteristics that must be built into the linkage. In this instance, what is required includes: (a) provision for a two-way information flow, and (b) attention to planning data such as needs assessment, resource availability and current or anticipated practice. These will be basic considerations in developing a linking model adapted from Gradwell (1972).

The basic sequence in the model is as follows: (a) stating objectives

of communication, (b) listing activities required to fulfill objectives, (c) allocating activities to human beings and to machines, (d) matching man and machines, and (e) organizing the communication system (Fig. 5).

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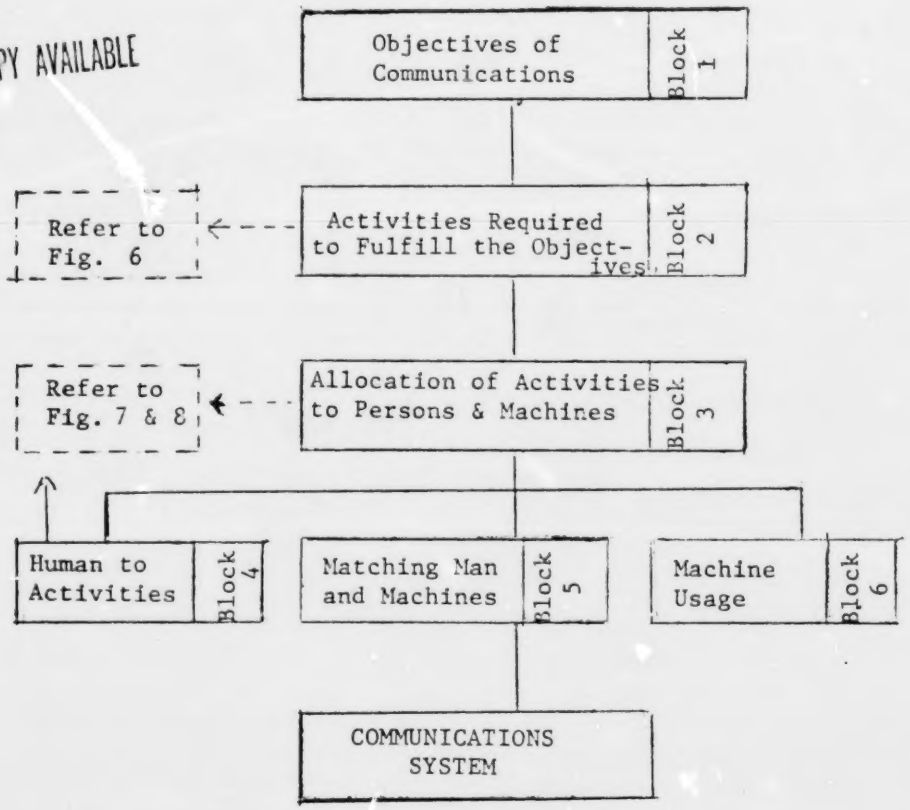

Fig. 5 Components of the Communications Systems Process[1]

Development of the Linkage Model

The objectives of communication are four: (a) to carry messages about staff training needs and professional objectives, field problems, and anticipated practices from the schools to the college; (b) to carry messages about college programs, training and consulting resources, and ways to access college programs and resources from the college to the school personnel; (c) to provide feedback channels for the messages; and (d) to aid cooperative planning in the development of in-service and continuing education programs.

In the case of the first objective, the college is the user system and the school is the source of information. In the second, the school is the user and the college is the source. It is essential to recognize that in the total concern with development of continuing education programs, the interaction is

1. Adapted from Gradwell (1972).

such that schools and colleges are both information users and information sources. A linking system that would satisfy the communication needs of these systems must provide for requests to be initiated in either system and for information to flow in both directions. Because of the interaction of planning outcomes in each system, it is desirable that the third and fourth objectives, feedback and cooperative planning, be part of the system.

Activities required to achieve the objectives are: (a) planning, (b) data collection, (c) data processing, and (d) information dissemination. The figure depicts the relationship of these parts in forming the linkage (Fig. 6).

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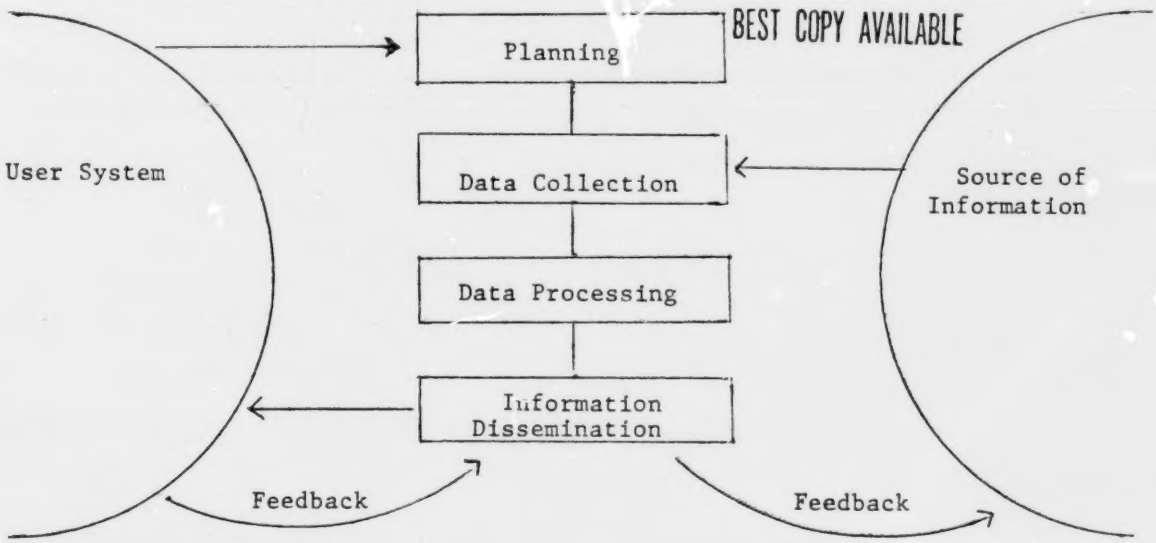

Fig. 6. Flow of Linking Sub-system Activities

The model proposes that selecting the activities for the linking system would result from a partnership of the systems. Needs assessments, resource analysis and program response modes would be the outcome of cooperative effort. Members of the linked systems would select the topics of concern and the message priorities in the information system.

The data collection activities can be further divided into these steps: (a) preparing the data collection instrument (questionnaire, rating scale, observation schedule); (b) selecting the population and sample for study; and (c) conducting the survey, i.e., administration of the instrument, including follow-up.

Data processing activities can be subdivided into the following steps: storage, retrieval, and analysis. Each of these steps presents problems to

be solved and can therefore be reduced to smaller units.

Information dissemination requires the following actions: (a) identifying information receivers, i.e., gatekeepers, leaders, innovators, and others of the user system; (b) translating information into understandable user language; (c) publishing, including the choice of media to be employed; and (d) consulting, or showing users how information may be adapted for use.

The next step of the Gradwell model, after stating the objectives of communication and listing the activities required to fulfill the objectives, is to allocate the activities to persons and to machines. Discussion will be directed first to human activities. Development of this portion of the linking system requires the following steps: (a) allocation of human activities, (b) preparing task descriptions, (c) writing job specifications, (d) identifying criteria for personnel selection, and (e) choosing training methods (Fig. 7).

Development of the portion of the system treating machine activities requires the following steps: (a)allocation of machine activities, (b) specifying each machine task, (c) writing procedures or program, and (d) documenting (Fig. 8).

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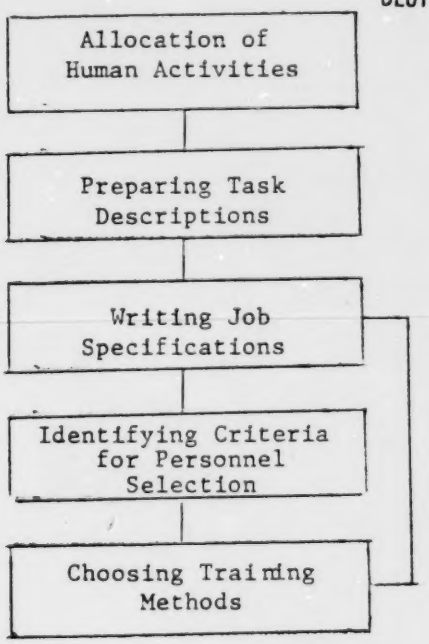

Fig. 7. Human Activities

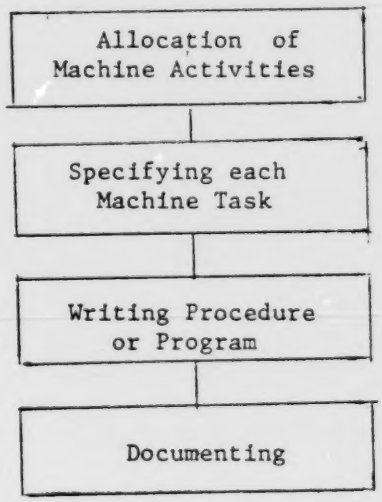

Fig. 8. Machine Activities

Matching man and machine activities so that working independently and together they achieve the expected outcome is the next step in creating the linking system. Matching requires (a) specifying the sequence of man and machine activities, with time lines estimated, so that the flow of work appears as a single schedule and (b) specifying the availability of personnel and equipment to meet the schedule requirements.

Need and Recommendation

Two developments on the educational scene are causing schools and colleges to take a greater interest in both continuing and in-service education for school personnel. These developments are (a) innovations in organization and instruction within individual school systems and (b) a search by career teachers for training and educational experience that they can find to be useful in their work. These developments are in strong contrast with the problems of the past: (a) preparing enough beginning teachers to fill the market demand and (b) inducting new teachers into a relatively stable educational organization and program.

The new circumstance requires an exchange of information between schools and colleges. More precisely, it requires a focused exchange between specific sets of school personnel and specific groups within a college. These might be the elementary school principals of a district or the science teachers in a school on the one hand and a program department or a policy group in a college on the other.

The probability of an easy flow of information can be increased if those who want to talk to each other do not have to establish their own connections, but can turn to an ongoing resource ready to make the connection. Such a linker, or "uncommitted middle man" would have knowledge of channels, of skilled personnel, and of techniques of information exchange to help the information seekers obtain good data efficiently. He would have time to attend to consultation and management.

The proposal is that the college should establish a visible linking service. Services might include conducting sampling studies with a short turn-around time as needed by curriculum units, helping school personnel locate resources within the University, bringing together persons having a common interest in a course or a program, or providing a continuing link with graduates for the purpose of program evaluation. The end purpose of such a service might be viewed as data collection and information dissemination for the support of the continuing education and career development of teachers.

The particular system that has been proposed is no more than a way of thinking about the problem and an attempt to identify elements to be included in a successful information program. At this point, a plan should be put to the test. An immediate mode of response might be a pilot project to help people gain experience and to improve performance by focusing on parts of the system where alternative methods exist.

As a guide to the development of pilot projects, a form labeled "Link Project Proposal" is attached to this report. The intent is that the "linker" and the person seeking information through the linking system, working together, would specify their expectations in advance to improve the odds that they would collect useful data and be able to evaluate the project.

College of Education

Education Career Development Office

1425 University Ave. S. E.

LINK PROJECT PROPOSAL — Administrative Units Involved in Link _____

_____

_____

PROJECT INITIATORS

OBJECTIVES OF THE PROPOSAL (What kind of information is sought and for what purpose is it needed?)

PROJECT ACTIVITIES

A. Planning: (What topics are of concern and which topics have highest priority?)

B. Data collection: (Describe the data collection instrument to be used and the method of administration; specify the population, sample selection if any, way in which population will be located; describe survey procedures, including follow-up plans.)

C. Data processing: (How will data be recorded and filed? What are the retrieval and analysis plans? What equipment, machines, standard programs or new programming will be required?)

D. Information dissemination: (To what persons in what audience is the information to be sent? Who is expected to use the information? Will the information require some translation into language or terms of those who will use it? What media will be used to inform users? Will there be consultation to help people use the information?)

ACTIVITIES ASSIGNED TO PERSONS AND TO MACHINES

A. Persons: (What tasks will be assigned to persons? What skills will be needed? What are the job specifications? What criteria should be used to select personnel? What are the instructions for performing each task? What staff training will be required?)

B. Machines: (What work is to be done by machine? What machine capabilities are needed? What machine procedures or programs are required? If this is a project that may be repeated, what documentation is planned?)

ACTIVITY SEQUENCE AND TIMING: (What is the sequence of man and machine tasks? What is the time needed for each task? What is the schedule for the total project?)

SUPPLIES AND EQUIPMENT: (Examine the activities you have specified for this project and list the types and amounts of supplies and equipment needed to carry them out.)

EVALUATION (What criteria will be used to evaluate the success of the project? What criteria will be used to evaluate the degree to which the project objectives are attained?)

BUDGET

A. Faculty salaries	
B. Graduate assistant salaries	
C. Other salaries and honoraria	
D. Services of University agencies	
E. Equipment	
F. Supplies	
G. Other: _____	
H. Total budget	

Submitted by: _____ Date: _____

Approved: _____

_____

_____

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